Europäisches Patentamt | European Patent Office | Office européen des brevets

Bescheinigung | Certificate | Attestation

Die angehefteten Unterlagen stimmen mit der ursprünglich eingereichten Fassung der auf dem nächsten Blatt bezeichneten europäischen Patentanmeldung überein.

The attached documents are exact copies of the European patent application described on the following page, as originally filed.

Les documents fixés à cette attestation sont conformes à la version initialement déposée de la demande de brevet européen spécifiée à la page suivante.

Patentanmeldung Nr. Patent application No. Demande de brevet n°

03015972.7

PRIORITY DOCUMENT
SUBMITTED OR TRANSMITTED IN COMPLIANCE WITH RULE 17.1(a) OR (b)

Der Präsident des Europäischen Patentamts;
Im Auftrag

For the President of the European Patent Office

Le Président de l'Office européen des brevets
p.o.

R C van Dijk

DEN HAAG, DEN
THE HAGUE,
LA HAYE, LE 28/07/04

Anmeldung Nr:
Application no.: 03015972.7
Demande no:

Anmeldetag:
Date of filing: 14.07.03
Date de dépôt:

Anmelder/Applicant(s)/Demandeur(s):

Osram Opto Semiconductors GmbH
Wernerwerkstrasse 2
93049 Regensburg
ALLEMAGNE

Bezeichnung der Erfindung/Title of the invention/Titre de l'invention:
(Falls die Bezeichnung der Erfindung nicht angegeben ist, siehe Beschreibung.
If no title is shown please refer to the description.
Si aucun titre n'est indiqué se referer à la description.)

Highly efficient uv-based conversion leds for generation of saturated colours with improved eye safety

In Anspruch genommene Priorität(en) / Priority(ies) claimed /Priorité(s) revendiquée(s)
Staat/Tag/Aktenzeichen/State/Date/File no./Pays/Date/Numéro de dépôt:

Internationale Patentklassifikation/International Patent Classification/
Classification internationale des brevets:

H01L33/00

Am Anmeldetag benannte Vertragstaaten/Contracting states designated at date of filing/Etats contractants désignées lors du dépôt:

AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LU MC NL
PT RO SE SI SK TR LI

P2003,0442 EP E

Highly efficient UV-based conversion LEDs for generation of saturated colours with improved eye safety

Recently UV LEDs with emission wavelength of around 400nm have attracted increasing interest due to their high efficiency and output power. Favorably is also the great variety of efficient phosphors available for UV excitation.
For the generation of highly saturated colors this method is very efficient especially for dominant wavelengths from 480 nm to 560 nm. Direct light emission from InGaN chips shows a strong temperature and current dependency increasing with the emission wavelength and may cause disturbing color shifts in applications. For the wavelength range between 530 nm to 560 nm the physical limitations of the InGaN system are reached and the efficiency of the InGaAlP system is not yet satisfying.
Conversion LED's based on near UV-light emitting chips provide solutions for both problems. But up to now a disadvantage of these LEDs is the residual UV emission which could lead to severe eye damages over time. OSRAM OS developed a eye safe solution by avoiding the UV peak and maintaining the high luminous efficiency. A luminous efficiency of 26 lm/W for λdom of approx. 560 nm was demonstrated, a value five times higher than the efficiency of green emitting InGaAlP diodes.
For these LEDs no more restrictions because of eye safety regulations are expected.

Claims:.

1. Semiconductor device emitting visible radiation, comprising
a semiconductor chip that emits electromagnetic radiation from the UV region and
a luminescence conversion element for partial conversion of said electromagnetic radiation to a radiation of higher wavelength,
whereby
a part of said electromagnetic radiation is not converted and
the semiconductor device comprises means for significantly reducing emission of said part of radiation that is not converted.

2. Semiconductor device as stated in claim 1,
whereby said means for significantly reducing emission of said part of radiation do not significantly reduce the emitted intensity of said visible radiation.